

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant : Gregory E. Tierney, et al.
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REPLY BRIEF

Sir:

This Reply Brief is in response to the Examiner's Answer dated June 10, 2008. This Reply Brief addresses the Examiner's Answer concerning the appealed claims 1-34.

I. Preliminary Comments

Numerous times throughout the Examiner's Answer dated June 10, 2008 ("Examiner's Answer"), in an effort to rebut arguments made in the Appeal Brief filed on March 18, 2008 ("Appeal Brief"), the Examiner's Answer recites an extensive amount of law with virtually no analysis of the cited law in relation to the present application. As an example, on pages 17-18 of the Examiner's Answer, a recitation of law pertaining to claim interpretation is made. However, the Examiner's Answer fails to explain how such a law supports the Examiner's interpretation of claim 1. Instead, the Examiner's Answer simply recites the law, and abruptly changes topics. For purposes of brevity, not all such improper rebuttals are addressed in this Reply Brief. However, Appellant's representative respectfully submits that such improper rebuttals should be deemed non-responsive to the corresponding arguments offered in the Appeal Brief.

II. Appealed Claim 1

On pages 20-23 of the Appeal Brief, Appellant's representative set forth reasons that U.S. Patent Pub. No. 2004/00029992 to Cypher ("Cypher") taken in view of U.S. Patent No. 6,922,756 to Hum ("Hum") fails to teach or suggest the first node recited in claim 1. In the Examiner's Answer, it is contended that three paragraphs (Pars. [0007], [0008] and [0068]) of Cypher disclose features of the first node recited in claim 1. Appellant's representative respectfully disagrees.

The first node recited in claim 1 associates an F-state with a copy of data in response to receiving the copy of the data from memory and receiving non-data responses from other nodes in the system. In claim 1, the non-data responses include an indication that at least a second node includes a shared copy of the data, and the F-state enables the first node to serve as an ordering point in the system capable of responding to requests from the other nodes in the system with a shared copy of the data. The first two cited paragraphs of Cypher are completely devoid of any teaching or suggestion that any structure or process associates any state (including an F-state) with a copy of data in response to receiving the copy of data from memory and receiving non-data responses from other nodes of the system, as does the first node recited in claim 1. Instead, two of the cited paragraphs of Cypher are related to rudimentary background information related to cache coherency (See

Cypher, Pars. [0006]-[0007]). Appellant's representative respectfully submits that Pars. [0006] and [0007] of Cypher are not relevant to the subject matter of claim 1.

The other cited paragraph of Cypher discloses a request agent 100 transmitting a read to own coherency request to a home client in response to a cache miss (See Cypher, Par. [0068]). Cypher also discloses that a home agent 102 (in the home client) detects the shared state for one or more other clients, and since the slave agents 104 are each in the shared state, and not in the owned state, the client 102 may supply the requested data directly to the requesting client 100 (See Cypher, Par. [0068]). The Home agent 102 transmits a data coherency reply to the requesting agent 100, including the data corresponding to the requested coherency unit, and the home agent 102 transmits invalidate coherency demands to each of the slave agents 104, which are maintaining shared copies of the affected coherency unit (See Cypher, Par. [0068]). The invalidate command causes the receiving slave agents to invalidate the corresponding coherency unit (See Cypher, Par. [0068]). Appellant's representative respectfully submits that any state assigned to the requested coherency unit in Cypher cannot correspond to the first node associating an F-state with a copy of data in response to receiving the copy of data from memory and receiving non-data responses from other nodes in the system, since there is nothing in Cypher that teaches or suggests that the requesting agent 100 receives any response to the read to own coherency request other than the coherency reply from the home agent 102. Thus, Appellant's representative maintains that Cypher taken in view of Hum fails to teach or suggest a first node associating an F-state with a copy of data, as recited in claim 1.

Moreover, the Examiner's Answer states that since Hum discloses a forward state (F-state), that Hum makes up for deficiencies of Cypher (See Examiner's Answer, Page 22). Appellant's representative respectfully disagrees. Appellant's representative respectfully submits that even if the F-state disclosed in Hum would be considered similar to the F-state recited in claim 1 (which Appellant does not agree with), nothing in Hum teaches or suggests that any structure or process associates an F-state with a copy of data in response to receiving the copy of data from memory and receiving non-data responses from other nodes, as does the first node recited in claim 1. Significantly, the Examiner's Answer fails to dispute this position.

Additionally, in the Appeal Brief, Appellant's representative argued that there is not proper motivation to combine the teachings of Cypher and Hum in the manner suggested in the Final Action (See Appeal Brief, Page 24). In response, the Examiner's answer cites an extensive amount of case law from *KSR Int'l Co. v. Teleflex* (See Examiner's Answer, Pages 24-25). However, the Examiner's Answer provides absolutely no analysis of the law to rebut Appellant's arguments regarding the motivation to combining and modify the teachings of Cypher in Hum. Appellant's representative notes that rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. ___, 127 S. Ct. 1727, 1741 (U.S. 2007). citing *In re Kahn*, 441 F.3d 997, 998 (CA Fed. 2006). Appellant's representative respectfully submits that the recitation of the law (without any accompanying legal analysis) amounts to the aforementioned "merely conclusory statements" and are thus nonresponsive. Therefore, Appellant's representative maintains that there is not sufficient motivation to combine and modify the teachings of Cypher and Hum in to establish a *prima facie* case of obviousness with respect to claim 1.

For the reasons discussed above, as well as those already stated in the Appeal Brief, Appellant's representative respectfully submits that claim 1 is patentable.

III. Appealed Claim 2

On pages 25-27 of the Appeal Brief, Appellant's representative set forth reasons that Cypher taken in view of Hum fails to teach or suggest that non-data responses comprise an indication that other nodes in a system do not have a copy of data requested by the first node, as recited in claim 2. In response, the Examiner's Answer stated the following:

Cypher explained "home agent updates its directory to indicate that the requesting client is the owner and that each of the other client's (coherency unit) is invalid; the invalidate demand causes the receiving slave to invalidate the corresponding coherency unit; [par. 0068]." Cypher further discloses that "the conveyance of the invalidation coherency demands may be considered a multicast, (hence broadcast); par. 0068. Examiner's Answer, Page 26.

Appellant's representative respectfully submits that the above statement illustrates that claim 2 has been misconstrued. In the cited section of Cypher, the Examiner's Answer fails to point out what structure or process corresponds to the non-data responses recited in claim 2. Instead, the Examiner's Answer highlights a portion of Cypher that discusses a situation where the home agent provides an invalidate demand to slave agents in response to a read to own coherency request. However, Appellant's representative respectfully notes that by virtue of claim 2's dependence from claim 1, the non-data responses recited in claim 2 are received by a first node (that provides a source broadcast request for data) from other nodes in the system (e.g., nodes other than memory from which the first node receives a copy of the requested data). Since Cypher fails to teach or suggest that any indication is received at a first node (e.g., a requesting agent) from other nodes (e.g., slave agents) that the other nodes in the system do not have a copy of the data requested by the first node, Appellant's representative respectfully submits that Cypher taken in view of Hum cannot make claim 2 obvious.

IV. Appealed Claim 3

On page 27 of the Appeal Brief, Appellant's representative set forth reasons that Cypher taken in view of Hum fails to teach or suggest that a source broadcast requesting data comprises a non-ownership request for data, as recited in claim 3. In response, the Examiner's Answer stated the following:

Cypher explained "home agent updates its directory to indicate that the requesting client is the owner and that each of the other client's (coherency unit) is invalid; the invalidate command causes the receiving slave to invalidate the corresponding coherency unit; [par. 0068]." Cypher further discloses that "the conveyance of the invalidation coherency demands" may be considered a multicast," (hence broadcast); par. 0068. Examiner's Answer, Page 26.

Appellant's representative respectfully submits that the above statement illustrates that claim 3 has been misconstrued. In the cited section of Cypher, the Examiner's Answer fails to demonstrate any structure or process that corresponds to the source broadcast requesting the data recited in claim 3. The Examiner's Answer highlights a portion of Cypher that discusses a situation where the home agent provides an invalidate demand to slave agents in response to a read to own

coherency request. Appellant's representative respectfully notes that in claim 3, the source broadcast requesting the data comprises a non-ownership request for the data, while the cited section of Cypher (Par. [0068]) discussed a response to a read to own coherency request from a request agent 100. The Examiner's Answer fails to even attempt to show where Cypher discloses that a source broadcast requesting the data comprises a non-ownership read request. Instead, the read to own coherency request taught in Cypher is one type of ownership request in direct contrast to claim 3. See, for example, Cypher at Par. [0068], lines 11-14 where the requesting agent that issued the read to own request is made owner.

V. Appealed Claim 4

On pages 27-28 of the Appeal Brief, Appellant's representative set forth reasons that Cypher taken in view of Hum fails to teach or suggest that a non-ownership request comprises a source broadcast read request, as recited in claim 4. In response, the Examiner's Answer stated the following:

Cypher discloses "in response to a coherency request, invalidation transactions may be conveyed to the sharing subsystems; par. 0008; and home agent sends invalidate coherency demands (i.e., non-ownership requests) to other slave agents;" par. 0069...
Examiner's Answer Page 27.

Appellant's representative respectfully submits that the invalidate coherency demands disclosed in Cypher do not correspond to the non-ownership request recited in claim 4, as contended in the Examiner's Answer. In claim 4, the non-ownership request comprises a source broadcast read request, while the invalidate demands disclosed in Cypher causes slave agents to invalidate a coherency unit (See Cypher, Par. [0069]). Thus, clearly, the invalidate coherency demands disclosed in Cypher do not correspond to the non-ownership request recited in claim 4.

VI. Appealed Claim 13

On pages 29-30 of the Appeal Brief, Appellant's representative set forth reasons that Cypher taken in view of Hum fails to teach or suggest an ordering point defined by an F-state migrates from a first node to another node in response to another node issuing a source broadcast non-ownership request for a copy of data,

as recited in claim 13. In response, the Examiner's Answer cited sections (e.g., Par. [0069]) of Cypher relating to resolution of a read to own (RTO) request, whereas claim 13 relates to a response to another node issuing a source broadcast non-ownership request (e.g., not an RTO demand) for a copy of data. Thus, Appellant's representative respectfully submits that the statements made in the Examiner's Answer regarding claim 13 and its reliance on Cypher fail to provide evidence sufficient to support a legal conclusion of obviousness.

VII. Appealed Claim 7

On pages 30-32 of the Appeal Brief, Appellant's representative set forth reasons that a controller being capable of silently evicting data stored in a cache line by modifying state information from an F-state to an invalid state for data, as recited in claim 7 is not taught or suggested by Cypher taken in view of Hum and in further view of U.S. Patent Pub. No. 2004/0123047 to Hum ("Hum 2"). The Examiner's Answer responded as follows:

The F-state can be silently evicted (i.e., transitioning to the I-state with no copy being written to memory).

Hum 2 (sic) identically discloses "a cache line in the F-state is used to respond to a request for a copy of the cache; the newly created copy is placed in the F-state and the cache line previously in the F-state is put in the Invalid (I) state"; Abstract... Examiner's Answer, Page 29.

Appellant's representative respectfully submits that the Examiner's Answer mistakenly cited Hum 2 instead of Hum. Moreover, Appellant's representative respectfully submits that nothing in the Abstract of Hum (or Hum 2) mentions a silent eviction. In fact, nothing in the cited Abstract even teaches or suggests that the cache line in Hum is transitioned to the I-state with no copy being written to memory, which the Examiner's Answer contends defines a silent eviction of a cache line. Significantly, Hum 2 (which shares the same named inventors as Hum) teaches silently evicting shared copies of a cache line (See Hum 2, Par. [0065]). Thus, Appellant's representative submits that the teachings of Hum 2 relating to silent eviction of a cache line, generally, is in sharp contrast to the silent eviction recited in claim 7, which is performed by modifying state information from the F-state to an invalid state.

Additionally, in response to arguments regarding the motivation to combine the teachings of Cypher, Hum and Hum 2, the Examiner's Answer merely recites law while providing no analysis of the law in relation to the present application (in the manner discussed in the preliminary comments).

VIII. Appealed Claims 10 and 31

On pages 32-33 of the Appeal Brief, Appellant's representative set forth reasons that the subject matter of claims 10 and 32 is not taught or suggested by Cypher taken in view of Hum and in further view of Hum 2. In response, the Examiner's Answer provided (virtually) the same rationale that was provided in response to arguments made in the Appeal Brief in favor of the patentability of claim 7 (See Examiner's Answer, Pages 30-32). Thus, Appellant's representative respectfully requests that the rejection of claims 10 and 31 be withdrawn for reasons similar to those discussed in the Reply Brief with respect to claim 7, as well as the arguments regarding the patentability of claims 10 and 31 set forth in the Appeal Brief.

IX. Appealed Claim 11

On pages 34-37 of the Appeal Brief, Appellant's representative set forth reasons that a system implementing a source broadcast protocol to process requests provided by nodes within the system, the system transfers to an associated forward progress protocol in response to a request failing in the source broadcast protocol, as recited in claim 11, is not taught or suggested in Cypher taken in view of Hum and in further view of U.S. Patent No. 6,138,218 to Arimilli ("Arimilli"). The Examiner's Answer responded by stating the following:

"Arimilli discloses... "a mechanism for making forward progress on retried snoop hits involves taking action, in response to detection an operation on the system bus which was [the] subject of a previous failed intervention which moves the coherency state of a requested cache item toward the expected coherency state at the completion of the original operation;" col. 6, ll 39-45..."
Examiner's Answer, Page 34.

Appellant's representative respectfully submits that the Examiner's Answer appears to repeat arguments from its Final Rejection and fails to identify any

structure or process transferring to a forward progress protocol from a source broadcast protocol, such as recited in claim 11. The Examiner's Answer merely cites a section of Arimilli that describes making "forward progress" for retried snoop hits. The cited section of Arimilli is devoid of any structure or process that corresponds to transferring to a forward progress protocol, as recited in claim 11 and no arguments or other evidence has been submitted to overcome the arguments presented in Appellant's Brief.

X. Appealed Claim 14

On pages 37-38 of the Appeal Brief, Appellant's representative set forth reasons that the subject matter of claim 14 is not taught or suggested by Cypher taken in view of Hum and in further view of Arimilli. In response, the Examiner's Answer provided the same rationale that was provided in response to arguments made in the Appeal Brief in favor of the patentability of claim 13 (See Examiner's Answer, Page 35). Thus, Appellant's representative respectfully requests that the rejection of claim 14 be withdrawn for reasons similar to those discussed in the Reply Brief with respect to claim 13, as well as the arguments regarding the patentability of claim 14 set forth in the Appeal Brief.

XI. Appealed Claim 19

On pages 38-39 of the Appeal Brief, Appellant's representative set forth reasons that Cypher taken in view of Hum and in further view of Arimilli fails to teach or suggest that a third state and a second state are the same. In response, the Examiner's answer simply cites sections of Arimilli and Hum that disclose multiple coherency states (See Examiner's Answer, Page 36). However, the Examiner's Answer fails to identify which states are being considered to correspond to the first, second and third states (by virtue of claim 19's dependence from claim 14) recited in claim 19. Thus, Appellant's representative respectfully maintains that Cypher taken in view of Hum and in further view of Arimilli does not teach or suggest the subject matter of claim 19. Therefore, for the reasons stated above, as well as those stated in the Appeal Brief, Appellant's representative respectfully requests that the rejection of claim 19 be withdrawn.

XII. Appealed Claim 20

On pages 40-42 of the Appeal Brief, Appellant's representative set forth reasons that Cypher taken in view of Hum and in further view of Arimilli does not make claim 20 obvious. In particular, it was argued that Cypher taken in view of Hum and in further view of Arimilli does not teach or suggest a source processor transitioning from a first state to a second state in response to receiving responses from memory and at least one target processor, the second state enabling the first processor to respond to requests from other processors of a plurality of processors with a copy of desired data, as recited in claim 20. In response, the Examiner's Answer stated the following:

Cypher discloses "a processing subsystem receiving coherency demands for a memory block which is modified in cache, changing state information for that block and changing state information to indicate the memory block is no longer valid"; par. [0062].

Hum also discloses "after request for ownership is granted, the state of the data is changed from a shared state to another state (e.g., modified); col. 2, lines 14-16; a peer node transitioning its copy of the cache line to a shared state"; col. 6, lines 47-55; col. 7, lines 11-17

Arimilli also discloses transitioning from the first state to a second state indicating that the data is shared [col. 5, ll. 60-67]; and the second node transitioning to a third state in response to receiving the shared copy of the data from the first node, such that the second node becomes an ordering point in the network for providing a shared copy of the data [col. 6, ll. 1-15]. Examiner's Answer, Pages 36-37.

The cited sections of Cypher, Hum and Arimilli merely disclose changing cache coherency states in various conditions. However, in the cited sections of Cypher, Hum and Arimilli, the Examiner's Answer still fails to identify any structure or process that corresponds to the source processor of claim 20 that transitions from the first state to the second state in response to receiving responses (to a broadcast request for desired data) from two different sources, namely memory and at least one other target processor. Nothing in the cited sections of Cypher, Hum or Arimilli (or elsewhere in the cited references) teaches or suggests this concept. No other arguments or evidence has been presented in the Examiner's Answer, such that the

record does not contain evidence sufficient to support the conclusion that claim 20 is obvious.

XIII. Appealed Claim 21

On pages 42-44 of the Appeal Brief, Appellant's representative set forth reasons that at least one other processor responding to a broadcast request with a response indicating that the at least one other processor does not include a valid copy of desired data, as recited in claim 21, is not taught or suggested by Cypher taken in view of Hum and in further view of Arimilli. In response, the Examiner's Answer stated the following:

Cypher unequivocally describes how "a home agent marks a requestor as the sole owner of the line and sends an RTO demand to the owning slave agent; home agent also sends invalidate coherency demands to all other slave agents with a shared copy; the owning slave agents reply with data to the requesting agent and invalidates its copy"; paragraph [0069]. Examiner's Answer, Page 37.

Nothing in the cited section of Cypher teaches or suggests that at least one processor (e.g., slave agents) responds to a broadcast request (which the examiner contends corresponds to an RTO demand) with a response indication that the at least one other processor does not include a valid copy of data, as recited in claim 21. In fact, FIG. 8B, which corresponds to Par. [0069] of Cypher, does not indicate that slave agents 104 provide any response to the invalidate coherency demand provided by home agent 102. Consequently, the record created by the Examiner's Final Rejection and the Examiner's answer fail to establish that claim 21 is obvious over Cypher taken in view of Hum and in further view of Arimilli.

XIV. Appealed Claims 23 and 24

On pages 44-46 of the Appeal Brief, Appellant's representative set forth reasons that the subject matter of claims 23 and 24 is not taught or suggested by Cypher taken in view of Hum and in further view of Hum 2. In response, the Examiner's Answer provided (virtually) the same rationale that was provided in response to arguments made in the Appeal Brief in favor of the patentability of claims 2 and 3 (See Examiner's Answer, Pages 38-39). Thus, Appellant's

representative respectfully requests that the rejection of claims 23 and 24 be withdrawn for reasons similar to those discussed in the Reply Brief with respect to claims 2 and 3, as well as the arguments regarding the patentability of claims 23 and 24 set forth in the Appeal Brief.

XV. Appealed Claim 26

On pages 47-48 of the Appeal Brief, Appellant's representative set forth reasons that Cypher taken in view of Hum and in further view of Arimilli does not make claim 26 obvious. In particular, it was argued that Cypher taken in view of Hum and in further view of Arimilli does not teach or suggest means for enabling a first node to respond to subsequent non-ownership requests for data from other nodes in the system by providing a shared copy of data received from memory, as recited in claim 26. In response, the Examiner's Answer cited a section of Cypher that describes a transaction that occurs in response to a read to own demand (See Examiner's Answer, Pages 42-43). Appellant's representative respectfully submits that a read to own demand does not correspond to subsequent non-ownership request for data, as recited in claim 26. In sharp contrast to claim 26, the read to own request is taught in Cypher as being an ownership type of request (See Cypher at Par. [0068] and [0069]).

XVI. Appealed Claim 29

On pages 50-51 of the Appeal Brief, Appellant's representative set forth reasons that means for blocking a home node from responding with data to another request if a first node provides a response to another request that includes a shared copy of data, as recited in claim 29 is not taught or suggested by Cypher taken in view of Hum and in further view of Arimilli. In response, the Examiner's Answer stated the following:

Cypher clearly discloses... the request agent initiates the transaction by sending a read to own request to the home agent; this causes (the) home agent to block new transaction to this coherency unit...; paragraph [0069]. Examiner's Answer, Pages 44-45.

Appellant's representative respectfully submits that in the cited section of Cypher, the home agent 102 blocks new transactions in response to receiving a read to own request from a requesting agent 100. Conversely, claim 29 recites means for blocking the home node from responding with data to another request for data if the first node provides a response to another request that includes a shared copy of the data. Thus, the cited section of Cypher blocks new transactions in a substantially different manner from claim 29. This difference seems to be because the requestor 100 in Cypher has requested ownership of the data when another slave agent 103 is the current owner of the coherency unit and the blocking helps to ensure that ownership is transferred to the requestor (See Cypher, at Par. [0069]).

XVII. Appealed Claim 30

On pages 51-53 of the Appeal Brief, Appellant's representative set forth reasons that Cypher taken in view of Hum and in further view of Arimilli does not make claim 30 obvious. In particular, it was argued in the Appeal Brief that enabling a source node, while in an F-state, to serve as an ordering point that is capable of responding to non-ownership requests for data by providing a shared copy of the data, as recited in claim 30, is not taught or suggested by Cypher taken in view of Hum and in further view of Arimilli. In response, the Examiner's Answer cited a section of Cypher that describes a transaction that occurs in response to a read to own demand (See Examiner's Answer, Pages 45-46). Appellant's representative respectfully submits that a read to own demand does not correspond to subsequent non-ownership requests for data since Cypher explicitly teaches that a read to own demand is an ownership type of request (Cypher, Par. [0068], lines 11-14 and Par. [0069]).

XVIII. Appealed Claim 32

On page 53 of the Appeal Brief, Appellant's representative set forth reasons that the subject matter of claim 32 is not taught or suggested by Cypher taken in view of Hum and in further view of Arimilli. In response, the Examiner's Answer provided (nearly) the same rationale that was provided in response to arguments made in the Appeal Brief in favor of the patentability of claim 13 (See Examiner's Answer, Page 35). Thus, Appellant's representative respectfully requests that the rejection of claim 32 be withdrawn for reasons similar to those discussed in the Reply Brief with respect to claim 13, as well as the arguments regarding the patentability of claim 32 set forth in the Appeal Brief.

XIX. Appealed Claim 34

On pages 54-55 of the Appeal Brief, Appellant's representative set forth reasons that the subject matter of claim 34 is not taught or suggested by Cypher taken in view of Hum and in further view of Arimilli. In response, the Examiner's Answer provided (nearly) the same rationale that was provided in response to arguments made in the Appeal Brief in favor of the patentability of claim 11 (See Examiner's Answer, Page 49). Thus, Appellant's representative respectfully requests that the rejection of claim 34 be withdrawn for reasons similar to those discussed in the Reply Brief with respect to claim 11, as well as the arguments regarding the patentability of claim 34 set forth in the Appeal Brief.

XX. Appealed Claims 16 and 22

On pages 55-56 of the Appeal Brief, Appellant's representative set forth reasons that the subject matter of claim 34 is not taught or suggested by Cypher taken in view of Hum, in further view of Arimilli and in further view of Hum 2. In response, the Examiner's Answer provided (nearly) the same rationale that was provided in response to arguments made in the Appeal Brief in favor of the patentability of claim 7 (See Examiner's Answer, Page 50). Thus, Appellant's representative respectfully requests that the rejection of claims 16 and 22 be withdrawn for reasons similar to those discussed in the Reply Brief with respect to

claim 7, as well as the arguments regarding the patentability of claims 16 and 22 set forth in the Appeal Brief.

XXI. CONCLUSION

In view of the foregoing remarks, Appellant's representative respectfully submits that the present application is in condition for allowance. Appellant's representative respectfully requests reconsideration of this application and that the application be passed to issue.

No additional fees should be due for this Reply Brief. In the event any fees are due in connection with the filing of this document, the Commissioner is authorized to charge those fees to Deposit Account No. 08-2025.

I hereby certify that this correspondence is being transmitted to the U.S. Patent and Trademark Office via electronic filing on July 29, 2008.

Respectfully submitted,

/Gary J Pitzer/

Gary J. Pitzer
Registration No. 39,334
Attorney for Appellants

CUSTOMER No.: 022879

Hewlett-Packard Company
Legal Department MS 79
3404 E. Harmony Road
Ft. Collins, CO 80528